VOICEMAIL/MEMO SERVICE

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention relates generally to telecommunication and computer networks, and more specifically to remote message retrieval.

2. Description of Related Art:

For busy individuals, it is often convenient to leave voice messages or memos to oneself. Currently, there are small devices that provide such functions, such as miniature tape recorders. Many people also create their own adhoc memo systems by calling their own telephone answering machines or telephone voicemail accounts and leaving messages to themselves.

Some companies offer special memo services in which a user calls a designated call center and leaves a voice message in his or her personal account. Unfortunately, such voicemail/memo services are limited and scope, as they do not provide a wide range of services to the same user. For example, current remote access memo services are usually limited to voice messages recorded via telephone and do not allow entry and retrieval via devices employing Transmission Control Protocol/Internet Protocol (TCP/IP). In addition, current memo services do not allow the account holder to leave public messages, which third parties may access.

Therefore, it would be desirable to have a method for recording and retrieving personal memos from a central location that can be accessed via both telephone and IP communication, and also allows

the recording of a message to and from parties other than the account holder.

SUMMARY OF THE INVENTION

The present invention provides a method, program and system for entering messages into a database. The method comprises accessing the database by means of one of a plurality of allowable communication devices, which may include phone, mobile phone, PDA, pager and computer. The user then enters a voice or text message into a designated account in the database. The message is stored in a uniform format, which is specified for the account. This uniform format is independent of the communication device used to access the database. When messages are retrieved from the database, the messages are converted from the uniform format into a format which is compatible with the device used to access the database.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 depicts a system diagram illustrating a plurality of interconnected heterogeneous networks in which the present invention may be implemented;

Figure 2 depicts a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention;

Figure 3 depicts a block diagram illustrating a data processing system in which the present invention may be implemented;

Figure 4A depicts a diagram illustrating a mobile phone in accordance with a preferred embodiment of the present invention;

Figure 4B depicts a block diagram illustrating the hardware configuration of mobile phone **400** in accordance with a preferred embodiment of the present invention;

Figure 5A depicts a diagram of a client in the form of a personal digital assistant (PDA) in accordance with a preferred embodiment of the present invention;

Figure 5B depicts a block diagram illustrating the hardware configuration of PDA **500** in accordance with a preferred embodiment of the present invention;

Figure 6 depicts a schematic diagram illustrating a general overview of the architecture of a voicemail/memo service in accordance with the present invention;

Figure 7 depicts a flowchart illustrating the process of recording a voice message/memo in accordance with the present invention;

Figure 8 depicts a flowchart illustrating the retrieval of voicemail/memos in accordance with the present invention; and

Figure 9 depicts a flowchart illustrating the use of Common Gateway Interface to access voicemail via TCP/IP in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, and in particular with reference to **Figure 1**, a system diagram illustrating a plurality of interconnected heterogeneous networks in which the present invention may be implemented is depicted. As illustrated, an Internet Protocol (IP) network **102**, a Local Area Network (LAN) / Wide Area Network (WAN) **104**, the Public Switched Telephone Network (PSTN) **109**, a cellular wireless network **112**, and a satellite communication network **116** make up the plurality of heterogeneous networks serviced by the present invention.

IP network **102** may be the publicly available IP network, a private IP network, or a combination of public and private IP networks. In any case, IP network **102** operates according to the Internet Protocol and routes packets among its many switches and through its many transmission paths. IP networks are generally known in the art to be expandable, fairly easy to use and heavily supported. Coupled to IP network **102** is a Domain Name Server (DNS) **108** to which queries may be sent, such queries each requesting an IP address based upon a Uniform Resource Locator (URL). IP network **102** supports 32 bit IP addresses as well as 128 bit IP addresses, which are currently in the planning stage.

LAN/WAN **104** couples to IP network **102** via a proxy server **106** (or another connection). LAN/WAN **104** may operate according to various communication protocols, such as the Internet Protocol, the Asynchronous Transfer

Mode (ATM) protocol, or other known packet switched protocols. Proxy server **106** serves to route data between IP network **102** and LAN/WAN **104**. A firewall that precludes unwanted communications from entering LAN/WAN **104** may also be located at the location of proxy server **106**.

Computer **120** couples to LAN/WAN **104** and supports communications with LAN/WAN **104**. Computer **120** may employ the LAN/WAN and proxy server **106** to communicate with other devices across IP network **102**. Such communications are generally known in the art and will not be further described herein except to expand upon the teachings of the present invention. As is also shown, phone **122** couples to computer **120** and may be employed to initiate IP Telephony communications with another phone or voice terminal using IP Telephony. In such an IP telephony system, a gatekeeper is deployed by a service provider to manage IP telephony for its users. An IP phone **154** connected to IP network **102** (or other phone, e.g., phone **124**) may communicate with phone **122** using IP telephony.

PSTN **109** is a circuit switched network that is primarily employed for voice communications, such as those enabled by a standard phone **124**. However, PSTN **109** also supports the transmission of data. Data transmissions may be supported to a tone based terminal, such as a FAX machine **125**, to a tone based modem contained in computer **126**, or to another device that couples to PSTN **109** via a digital connection, such as an Integrated Services Digital Network (ISDN) line, an Asynchronous Digital Subscriber Line (ADSL), or another

digital connection to a terminal that supports such a connection. As illustrated, a voice terminal, such as phone **128**, may couple to PSTN **109** via computer **126** rather than being supported directly by PSTN **109**, as is the case with phone **124**. Thus, computer **126** may support IP telephony with voice terminal **128**, for example.

Cellular network **112** supports wireless communications with terminals operating in its service area (which may cover a city, county, state, country, etc.). As is known, cellular network **112** includes a plurality of towers, e.g., **130**, that each service communications within a respective cell. Wireless terminals that may operate in conjunction with cellular network **112** include wireless handsets **132** and wirelessly enabled laptop computers **134**, for example. Wireless handsets **132** could be, for example, personal digital assistants, wireless or cellular telephones, or two-way pagers. Cellular network **112** couples to IP network **102** via gateway **114**.

Wireless handsets **132** and wirelessly enabled laptop computers **134** may communicate with cellular network **112** using a wireless application protocol (WAP). WAP is an open, global specification that allows mobile users with wireless devices, such as, for example, mobile phones, pagers, two-way radios, smartphones, communicators, personal digital assistants, and portable laptop computers, to easily access and interact with information and services almost instantly. WAP is a communications protocol and application environment and can be built on any operating system including, for example, Palm OS,

EPOC, Windows CE, FLEXOS, OS/2, and JavaOS. WAP provides interoperability even between different device families.

WAP is the wireless equivalent of Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML). The HTTP-like component defines the communication protocol between the handheld device and a server or gateway. This component addresses characteristics that are unique to wireless devices, such as data rate and round-trip response time. The HTML-like component, Wireless Markup Language (WML), defines new markup and scripting languages for displaying information to and interacting with the user. This component is highly focused on the limited display size and limited input devices available on small, handheld devices. For example, a typical cell phone may have only a 4x10-character display with 16-gray levels and only a numeric keypad in addition to up/down volume keys.

Cellular network **112** operates according to an operating standard, which may be the Advanced Mobile Phone System (AMPS) standard, the Code Division Multiple Access (CDMA) standard, the Time Division Multiple Access (TDMA) standard, or the Global System for Mobile Communications or Groupe Speciale Mobile (GSM), for example. Independent of the standard(s) supported by cellular network **112**, cellular network **112** supports voice and data communications with terminal units, e.g., **132** and **134**.

Satellite network **116** includes at least one satellite dish **136** that operates in conjunction with a satellite **138** to provide satellite communications with a plurality of terminals, e.g., laptop computer **142** and

satellite handset **140**. Satellite handset **140** could also be a two-way pager. Satellite network **116** may be serviced by one or more geosynchronous orbiting satellites, a plurality of medium earth orbit satellites, or a plurality of low earth orbit satellites. In any case, satellite network **116** services voice and data communications and couples to IP network **102** via gateway **118**.

Wireless Proxy **160** is coupled to IP network **102** and is coupled to a plurality of towers, e.g., **162**, which each provide wireless communications with wireless devices such as wireless device **164**. Wireless Proxy **160** provides access to IP network **102** to wireless device **164**, such as a personal digital assistants (PDA) or a wireless telephone, that may require proprietary or other special protocols in order to communicate with IP network **102**. For example, wireless proxy server **160** may be a 3Com server utilizing 3Com protocols for communicating with a Palm VII, a handheld portable computing device available from 3Com Corporation in Santa Clara, California.

In a preferred embodiment of the present invention, wireless proxy **160** is a 3Com proxy server supporting communications with a Palm VII personal organizer and portable computing device **164** is a Palm VII personal organizer. In this embodiment, communications between wireless proxy server **160** and portable computing device **164** is facilitated by the use of Palm Query Applications (PQAs). A PQA is like a mini-Web site that resides on portable computing device **164**. That is, a PQA is a special kind of record database. A typical PQA contains

an HTML form or a list of hyperlinks that request additional information either locally – on personal computing device **164** – or remotely – on the Internet.

Referring to **Figure 2**, a block diagram of a data processing system that may be implemented as a server is depicted in accordance with a preferred embodiment of the present invention. Data processing system **200** may be a symmetric multiprocessor (SMP) system including a plurality of processors **202** and **204** connected to system bus **206**. Alternatively, a single processor system may be employed. Also connected to system bus **206** is memory controller/cache **208**, which provides an interface to local memory **209**. I/O bus bridge **210** is connected to system bus **206** and provides an interface to I/O bus **212**. Memory controller/cache **208** and I/O bus bridge **210** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge **214** connected to I/O bus **212** provides an interface to PCI local bus **216**. A number of modems may be connected to PCI bus **216**. Typical PCI bus implementations will support four PCI expansion slots or add-in connectors. Communications links to network computers may be provided through modem **218** and network adapter **220** connected to PCI local bus **216** through add-in boards.

Additional PCI bus bridges **222** and **224** provide interfaces for additional PCI buses **226** and **228**, from which additional modems or network adapters may be supported. In this manner, data processing system **200** allows connections to multiple network computers. A memory-mapped graphics adapter **230** and hard disk **232** may

also be connected to I/O bus **212** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure 2** may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 2** may be, for example, an IBM RISC/System 6000 system, a product of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) operating system.

With reference now to **Figure 3**, a block diagram illustrating a data processing system is depicted in which the present invention may be implemented. Data processing system **300** is an example of a client computer. Data processing system **300** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **302** and main memory **304** are connected to PCI local bus **306** through PCI bridge **308**. PCI bridge **308** also may include an integrated memory controller and cache memory for processor **302**. Additional connections to PCI local bus **306** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **310**, SCSI host bus adapter **312**, and expansion bus interface

314 are connected to PCI local bus **306** by direct component connection. In contrast, audio adapter **316**, graphics adapter **318**, and audio/video adapter **319** are connected to PCI local bus **306** by add-in boards inserted into expansion slots. Expansion bus interface **314** provides a connection for a keyboard and mouse adapter **320**, modem **322**, and additional memory **324**. Small computer system interface (SCSI) host bus adapter **312** provides a connection for hard disk drive **326**, tape drive **328**, and CD-ROM drive **330**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **302** and is used to coordinate and provide control of various components within data processing system **300** in **Figure 3**. The operating system may be a commercially available operating system, such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provide calls to the operating system from Java programs or applications executing on data processing system **300**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive **326**, and may be loaded into main memory **304** for execution by processor **302**.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 3** may vary depending on the implementation. Other internal hardware or peripheral

devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 3**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

As another example, data processing system **300** may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system **300** comprises some type of network communication interface. As a further example, data processing system **300** may be a Personal Digital Assistant (PDA) device, which is configured with ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 3** and above-described examples are not meant to imply architectural limitations. For example, data processing system **300** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **300** also may be a kiosk or a Web appliance.

With reference now to **Figure 4A**, a diagram illustrating a mobile phone is depicted in accordance with a preferred embodiment of the present invention. Mobile phone **400** includes a display **406** for presenting textual and graphical information. Display **406** may be a known display device, such as a liquid crystal display (LCD) device.

Mobile phone **400** may also include keypad **408**, speaker **414**, and microphone **416**. The keypad may be used

to enter, for example, telephone numbers, user identification information, and commands for interacting with the interface. Audio feedback may be presented via speaker **414**. In addition to normal voice conversation, feedback may include other information, for example, an audio description of user location (as determined by positioning technologies). And microphone **416** can be used not only for voice conversation, but for entering specific voice commands for voice actuated functions.

Mobile phone **400** also includes antenna **418**, which is necessary for establishing wireless communication links with remote transmitting towers.

Turning now to **Figure 4B**, a block diagram illustrating the hardware configuration of mobile phone **400** is shown in accordance with a preferred embodiment of the present invention. Figure **4B** illustrates the increasing sophistication of modern mobile phone designs.

Mobile phone **400** employs bus architecture. Processor **422** and main memory **424** are connected to bus **430**. Display adapter **426**, keypad adapter **428**, storage **432**, and audio adapter **434** are also connected to bus **430**. Mobile phone **400** also includes wireless link **436** connected to bus **430**. Those of ordinary skill in the art will appreciate that the hardware in **Figure 4B** may vary depending on the implementation. Other internal hardware or peripheral devices may be used in addition to or in place of the hardware depicted in **Figure 4B**.

Mobile phone **400** might rely on Wireless Application Protocol (WAP) for facilitating communications. WAP is a standard for providing wireless phones, pagers and other

handheld devices with secure access to e-mail and text-based Web pages. WAP provides a complete environment for wireless applications that includes a wireless counterpart of TCP/IP and a framework for telephony integration such as call control and phone book access. WAP features the Wireless Markup Language (WML), which was derived from Phone.com's HDML and is a streamlined version of HTML for small screen displays. It also uses WMLScript, a compact JavaScript-like language that runs in limited memory. WAP also supports handheld input methods such as a keypad and voice recognition. Independent of the air interface, WAP runs over all the major wireless networks in place. It is also device independent, requiring only a minimum functionality in the unit so that it can be used with a myriad of phones and handheld devices.

The depicted example in **Figure 4B** and above-described examples are not meant to imply architectural limitations.

With reference now to **Figure 5A**, a diagram of a client in the form of a personal digital assistant (PDA) is depicted in accordance with a preferred embodiment of the present invention. PDA **500** includes a display **502** for presenting textual and graphical information. Display **502** may be a known display device, such as a liquid crystal display (LCD) device. The display may be used to present a map or directions, calendar information, a telephone directory, an electronic mail message, etc. In these examples, screen **502** may receive user input using an input device such as, for example, stylus **510**.

PDA **500** may also include keypad **504**, speaker **506**, and antenna **508**. Keypad **504** may be used to receive user input in addition to using touch screen **502**. Speaker **506** provides a mechanism for audio output, such as presentation of an audio file. Antenna **508** provides a mechanism used in establishing a wireless communications link between PDA **500** and a network, such as network **100** in **Figure 1**.

PDA **500** also preferably includes a graphical user interface that may be implemented by means of systems software residing in computer readable media in operation within PDA **500**.

Turning now to **Figure 5B**, a block diagram illustrating the hardware configuration of PDA **500** is shown in accordance with a preferred embodiment of the present invention. PDA **500** is an example of a PDA in which code or instructions implementing the processes of the present invention may be located. PDA **500** includes a bus **522** to which processor **524** and main memory **526** are connected. Display adapter **528**, keypad adapter **530**, storage **532**, and audio adapter **534** also are connected to bus **522**. Cradle link **536** provides a mechanism to connect PDA **500** to a cradle used in synchronizing data in PDA **500** with another data processing system. Further, display adapter **528** also includes a mechanism to receive user input from a stylus when a touch screen display is employed.

An operating system runs on processor **524** and is used to coordinate and provide control of various components within PDA **500** in **Figure 5B**. The operating

system may be, for example, a commercially available operating system such as Windows CE, which is available from Microsoft Corporation. Instructions for the operating system and applications or programs are located on storage devices, such as storage **532**, and may be loaded into main memory **526** for execution by processor **524**.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 5B** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in Figure 5B.

Client machine **300**, mobile phone **400**, and PDA **500** are presented simply as examples of the various means by which the present invention may be implemented. The present invention may also be implemented using pagers, palm pilots, landline telephone systems, as well as any other device which may be used to enter and/or retrieve information to and from a database.

A primary advantage of the present invention is the ability to store voice messages/memos in a uniform format, which is independent of the input and retrieval devices. In this manner, all messages can be stored in the same database, regardless of the hardware used for input and retrieval of those messages. The use of a single database ensures that all input/retrieval methods are synchronized. Examples of uniform formats that may be used for storing messages/memos in the database include, but are not limited to, MP3, wave (WAV),

Windows Media Audio (WMA), Unix AUdio (AU), and Real Audio (RA).

As an example, a user may leave a voice message by using a cellular phone. This message is then stored in the database as an MP3 file. Later, the owner of the account may retrieve the message by means of a personal computer. In this case, the MP3 file would be sent as a data file, which could be displayed as text on the computer screen. Another example could go in the reverse direction: The person leaving the message could use an email text message, which would be converted into MP3 format when stored in the database. If the account owner retrieves the message by using a telephone, the MP3 file is played over the phone as a voice message.

Referring now to **Figure 6**, a schematic diagram illustrating a general overview of the architecture of a voicemail/memo service is depicted in accordance with the present invention. The two main methods of entering and retrieving messages/memos are by telephone **601** and TCP/IP **603**. Separate remote access servers **602** and **604** are used to access message database **605**, depending on the input or retrieval method. In the present invention, both voice and TCP/IP messages/memos are being stored in the same database **605**. As explained above, all input and output methods are synchronized because they are all accessing the same message data.

Referring to **Figure 7**, a flowchart illustrating the process of recording a voice message/memo is depicted in accordance with the present invention. As explained in reference to **Figure 6**, the user may contact the voicemail/memo service by means of telephone or TCP/IP

(step **701**). If using a telephone (e.g., cell or landline phone), the user calls the voicemail/memo service using a special 1-800 telephone number.

When requested by the automated service, the user enters a personal identification number (PIN), followed by a password (step **702**). The remote access server determines if the PIN and password are valid (step **703**). If the PIN and/or password are not valid, the remote access server denies access to the message database (step **704**), and may allow the caller to enter another PIN and/or password. If the PIN and password entered by the user are valid, the remote access server grants the user access to the message database account which is associated with that PIN (step **705**). The user then enters a message (step **706**). The message may be a voice message by means of telephone or voice-over-IP. Alternatively, the user may enter a IP text message. Regardless of the method of input, the remote access server converts the message into a uniform data format, which has been specified for that account or database (step **707**). As explained above, there are several formats, such as MP3 and wave, which may be used as the uniform format. In addition, if the specified uniform format is the same as the format used by the input device, then there is not need to perform the conversion in step **707**. After the message has been converted to the specified uniform format (if necessary), the server enters the message into the message database (step **707**).

Referring now to **Figure 8**, a flowchart illustrating the retrieval of voicemail/memos is depicted in accordance with the present invention. Similar to **Figure 7**, the user contacts the voicemail/memo service (step

801) and enters a PIN and password when requested by the system (step **802**). The remote access server determines if the PIN and are valid (step **803**). If the PIN and/or password are not valid, the remote access server denies the user access to the message database (step **804**). The user may enter another PIN and/or password.

If the PIN is valid, the remote access server grants the user access to the message database account associated with that PIN (step **805**). The user then enters a special message retrieval code (step **806**), and the remote access server retrieves messages from the database and determines the method by which the user is accessing the database (e.g., phone or computer) (step **807**). The server then converts the messages from the uniform storage format into a data format that is compatible with the retrieval device (step **808**). (As with step **707**, it might not be necessary to convert the message data into another format.) The message data is then sent in the appropriate format to the user's retrieval device (step **809**).

Referring to **Figure 9**, a flowchart illustrating the use of Common Gateway Interface to access voicemail via TCP/IP is depicted in accordance with the present invention. The methodology presented in the present example is Java-based. However, it should be noted that other architectures, utilizing different technologies, may be used to implement the present invention. After the IP server receives an IP request for access to the message database (step **901**), the user logs in a special servlet (step **902**). An authentication servlet is then

loaded (step **903**). This servlet matches ID data (i.e. PIN) with an account in the database (step **904**). When messages are retrieved from the database, the servlet returns the messages in an HTTP response (step **905**). The servlet uses Java database connectivity (JDBC) to access the database. JDBC is a Java application program interface (API), which is a language and message format that is used by an application program to communicate with the operating system or some other control program, such as a database management system (DBMS).

While different methods (i.e. phone, computer) may be used to enter and retrieve message, it should be emphasized that the data in the message database is stored in a uniform format. This uniform storage format is then converted depending on the method of retrieval, as explained above. Converting voice and TCP/IP messages into a uniform storage format allows the user to access both voice messages and text messages from the same service, thus providing the user with "one stop shopping".

The present invention may also be used to leave public messages for selected third parties. For example, the account holder may wish to leave a detailed message for a group of friends or colleagues. The account holder may leave the message and then provide specific people with the necessary PIN and password. The user would most likely set up a separate public account for this purpose, in order to prevent unwanted access of personal messages and memos.

It is important to note that while the present invention has been described in the context of a fully

functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.